WARM UP:
p. 521 #24

(a) Write hypotheses (read part (a) of the problem to get the Ha)
(b) What is a Type I error?
(c) What is Type II error?
(d) What is Power?
(e) The p-value for the test is 0.1883. Interpret this in context.

(a) Ho: $p_M = p_W$
Ha: $p_M > p_W$

(b) Type I error = We conclude that more men than women shop online for books, when really they are equal.

(c) Type II error = We conclude that men and women shop online for books equally, when really men shop online for books more than women.

(d) The probability that we conclude that men shop more online for books, and we are correct.

(e) p-value = probability of getting our sample or something more extreme, if the claim (Ho) is true.

There is an 18.83% chance of getting a sample where the difference between men and women purchasing books online is 3% or more, if that the % of men and women purchasing books online is truly equal.

$\hat{P}_M - \hat{P}_W$

CH. 22 PRACTICE

Practice problems from class:

9) (a) conditions met -> Normal Model -> 2 prop Z Interval

(b) $\hat{p}_m = 411/1012$ $\hat{p}_w = 535/1062$

$$(0.406 - 0.504) \pm 1.96\sqrt{\frac{(0.406)(0.594)}{1012} + \frac{(0.504)(0.496)}{1062}}$$

= (-0.1403, -0.055)

We are 95% confident that the true difference in the % of senior men and women who have arthritis is between 14.03% and 5.5%.

(c) Yes, our interval suggests a difference between the % of males and females who suffer from arthritis. The value of 0 (no difference between the 2 proportions) is NOT in the interval, suggesting that there is a difference.

Since our interval is entirely negative, and we subtracted MEN - WOMEN, this indicates that WOMEN have the higher % of arthritis sufferers.

17) $\hat{p}_D = 54/284$ $\hat{p}_L = 11/41$

(a) Prospective Study with Blocking

(b) Ho: $p_D = p_L$

Ha: $p_D \neq p_L$

(b) STATE	CHECK
- 2 indep. SRS	- assumed representative samples and parents are indep. of each other
- $n_D\hat{p}_D$	- 54
$n_D\hat{q}_D \geq 10$	- 230 ≥ 10
$n_L\hat{p}_L$	- 11
$n_L\hat{q}_L$	- 30
- $pop_D \geq 10*n_D$	- there are more than 2840 kids whose
$pop_L \geq 10*n_L$	parents disapprove and more than 410 whose parents are lenient on smoking

conditions met --> normal model for 2 prop Z test

(d) $Z = \dfrac{0.1901 - 0.2683}{\sqrt{\dfrac{(0.2)(0.8)}{284} + \dfrac{(0.2)(0.8)}{41}}} = -1.169$

2*P(Z < -1.169) = 0.2422

We fail to reject Ho b/c p-value of 0.2422 is > α = 0.05.
We have insufficient evidence that the percent of students who started smoking is different between lenient and disapproving parents.

PRACTICE: p. 520

#13- assume conditions met
add (d): Explain what 95% conf. means in this problem

#23- do conditions

13) $\hat{p}_V = 333/2455$ $\hat{p}_{UV} = 499/2452$

(a) Conditions met --> normal model for 2 prop Z Int

(b)

$$(0.1356 - 0.2035) \pm 1.96\sqrt{\frac{(0.1356)(0.8644)}{2455} + \frac{(0.2035)(0.7965)}{2452}} =$$

= (-0.088, -0.047)

We are 95% confident that the difference in the % of ear infections for vaccinated and unvaccinated kids is between 8.88% and 4.7%.

(c) Yes, I believe the vaccination is effective. Since 0 isnot in the interval, we have evidence that there is a difference between the % of ear infections for vaccinated & unvaccinated kids. Since the difference is negative (and we subtracted Vacc -- UnVacc, this shows that unvaccinated kids had a highere % of ear infections.

(d) In repeated samples of 2455 vaccinated kids and 2452 unvaccinated kids, the intervals created would catch the true difference in the % of ear infections 95% of the time.

23) $\hat{p}_1 = \frac{340}{630}$ $\hat{p}_2 = \frac{515}{1010}$ Ho: $p_1 = p_2$ Ha: $p_1 > p_2$

Conditions:

1) 2 independent SRS	1) stated random samples & assumed the 2 polls are indep.
2) $n_1\hat{p}_1 \geq 10$ $n_1\hat{q}_1 \geq 10$ $n_2\hat{p}_2 \geq 10$ $n_2\hat{q}_2 \geq 10$	2) $340 \geq 10$ $290 \geq 10$ $515 \geq 10$ $495 \geq 10$
3) $pop_1 \geq 10n_1$ $pop_2 \geq 10n_2$	3) there are more than 6,300 and 10,100 voters

Conditions met => normal model => 2-Prop Z test

$$z = \frac{0.5397 - 0.5099}{\sqrt{\frac{(0.5213)(0.4787)}{630} + \frac{(0.5213)(0.4787)}{1010}}} = 1.1743$$

$P(Z > 1.1743) = 0.1201$

We fail to reject Ho because our p-value of 0.1201 is $> \alpha = 0.05$. We have insufficient evidence that the true percent of voters who favor the candidate in the first poll is greater than the percent in the second poll. The results do NOT indicate a decrease in voter support for the candidate.

(b) If our conclusion was wrong, then we failed to reject when we should have rejected. This is a Type II error.

(c) We concluded there was no difference. No need for conf. int.

However, what level of confidence would we have used???

Go back to #23 and answer the following:

(d) Type I error
(e) Type II error
(f) Power
(g) Interpret the P-Value

(d) Type I error = Concluding that there was a decrease in voter support, when really there was not

(e) Type II error = Concluding that there was not a decrease in voter support (it stayed the same), when really there was a decrease in support

(f) Power = The probability of concluding there was a decrease in voter support, and being right.

(g) There is a 12.01% chance of getting a sample where the difference in voter support from the first poll to the second poll is 3% or more, if there really was no change in the voter support (there was equal support in the 1st and 2nd poll).